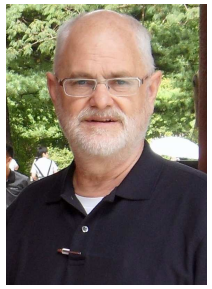
PHYSICS DIVISION/ ACCELERATOR R&D CAPABILITIES

MICHAEL KELLY
Accelerator Development Group Leader
Physics Division

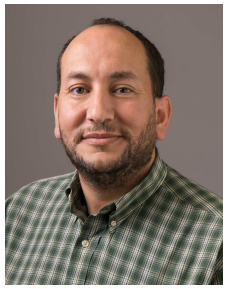
2018 Midwest Regional Workshop on Accelerator Stewardship Test Facility Program

Thursday Dec. 6, 2018

Faces of Accelerator R&D in Physics Division

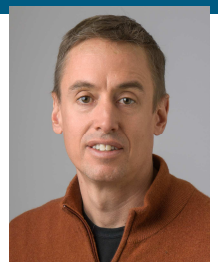


Jerry Nolen



Brahim Mustapha

Jim Specht



Mike Kelly

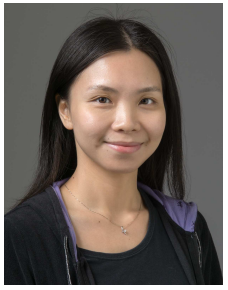
Zack Conway

Tom Reid

Ben Guilfoyle

Mark Kedzie

Jake Kilbane



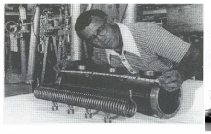
Trista Ng

Gary Zinkann

Students:
Joe BeLow
Aziz Abogoda
Zamin Noorani

A Few Bits of History From ATLAS and Physics Division

https://www.anl.gov/atlas



Helical Nb resonator developed at ANL for a heavy-ion linac.

Start of development of superconducting linac

Positive Ion Injector (Uranium upgrade)

Commissioning of Intensity Upgrade Cryomodule

1970 — 1978 — 1985 — 1992 — 2001 — 2009 — 2014 — 2019 — ...

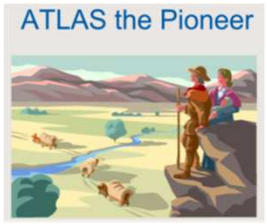
Commissioning of ATLAS SC Linac (1st and still most advanced SC accelerator for ions)

Argonne Tandem Linear Accelerator System (ATLAS) national user facility begins operations

Linac cavities for IUAC New Delhi

Start of operations for ATLAS 109 MHz Energy Upgrade

Refurbishment of 109 MHz cryomodule



ATLAS 25th Anniversary Celebration

Capability: ATLAS 10-20 MeV/u ion beams (protons to uranium) for stable isotopes plus many hundreds of short lived isotopes

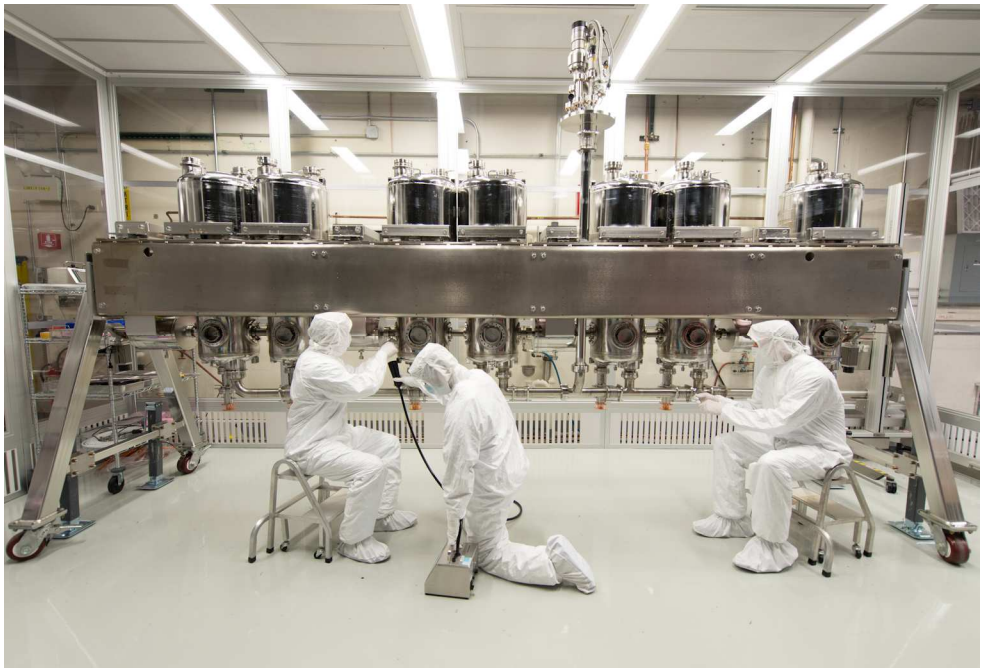
Capabilities: Superconducting Cavity Processing and Testing

Argonne superconducting cavity processing facility

- Presently working LCLS-II-HE R&D
- ~100 cavity processing procedure/yr

(ADTF) ANL cavity cold testing facility with large diameter cryostat and helium refrigerator (FRIB cavity here)

Capabilities: Ion Linac R&D, Design and Construction

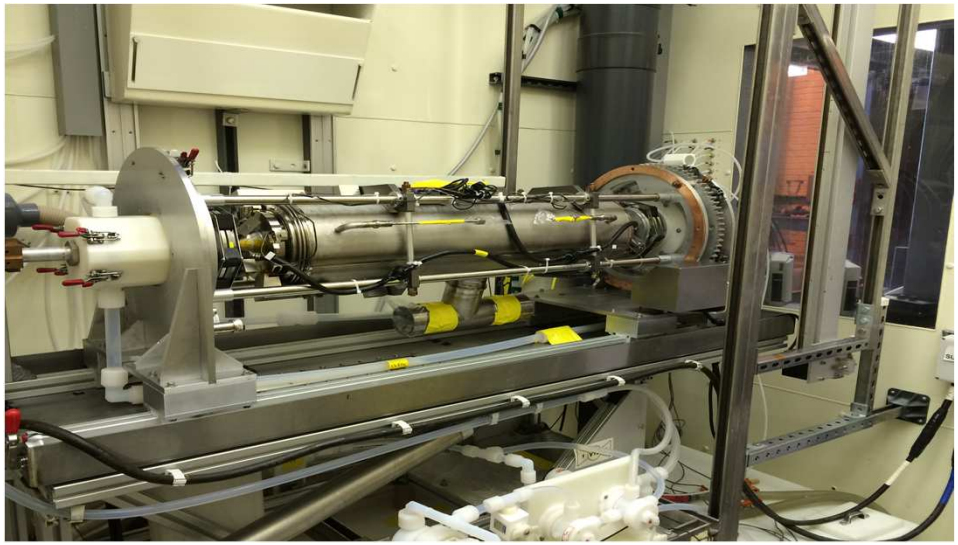


ATLAS Intensity Upgrade 72 MHz Quarter-Wave Resonator Cryomodule (2014); technology for high intensity ion linac

ATLAS 109 MHz Quarter-wave Cryomodule (2009); AIP 2017-19

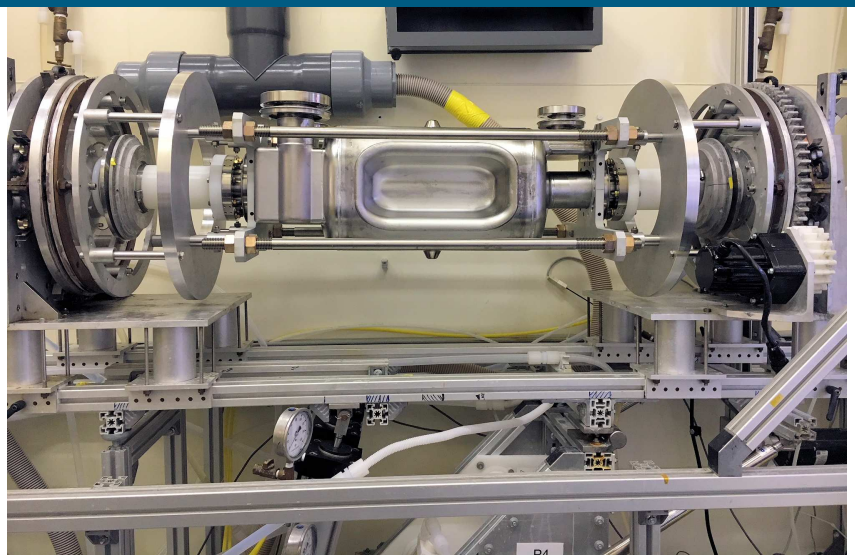
Capabilities: Electron Linac Technology

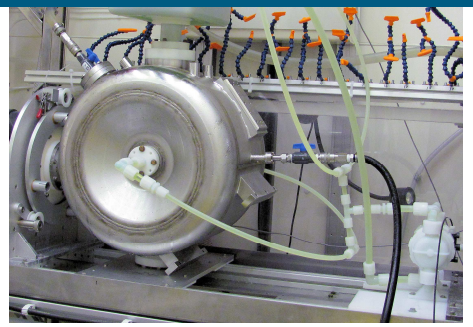
A bare superconducting electron accelerator cavity built in industry and processed at Argonne



A dressed (finished) LCLS-II superconducting electron accelerator cavity built in industry and processed at Argonne

Capabilities: Cavity Processing for ATLAS, PIP-II, APS, LCLS-II, FRIB, EIC, HL-LHC

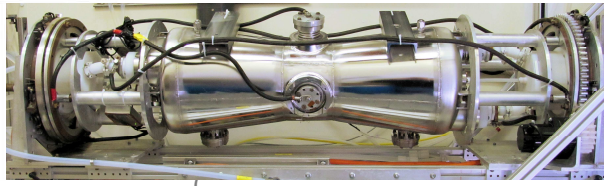






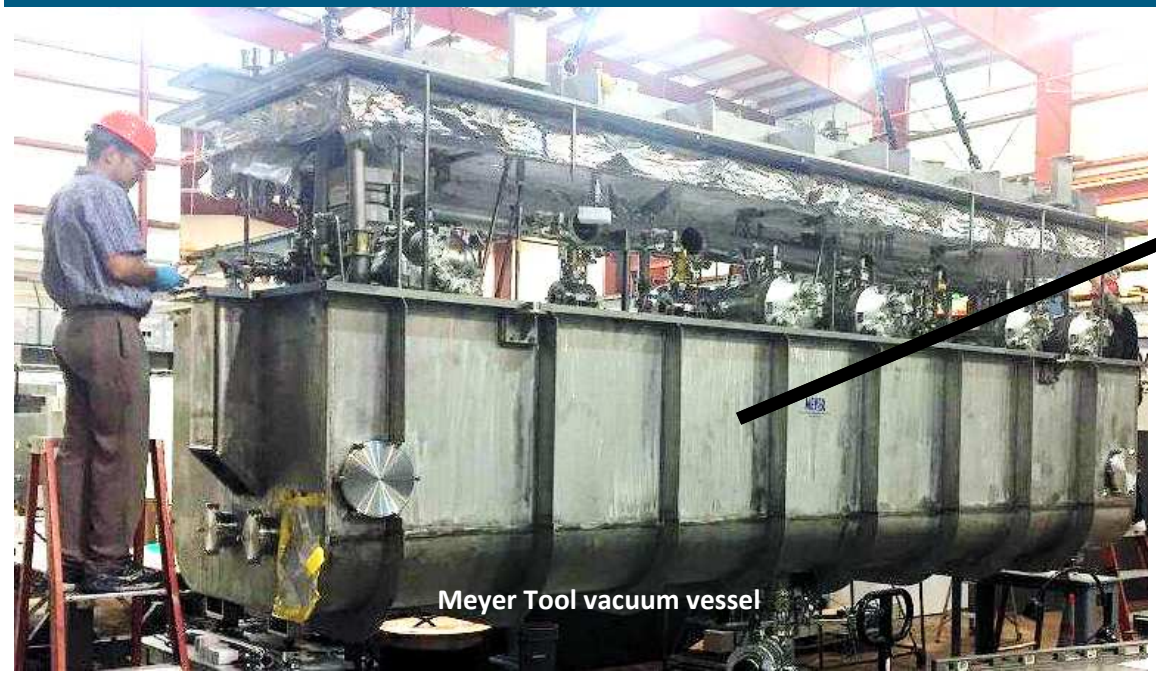


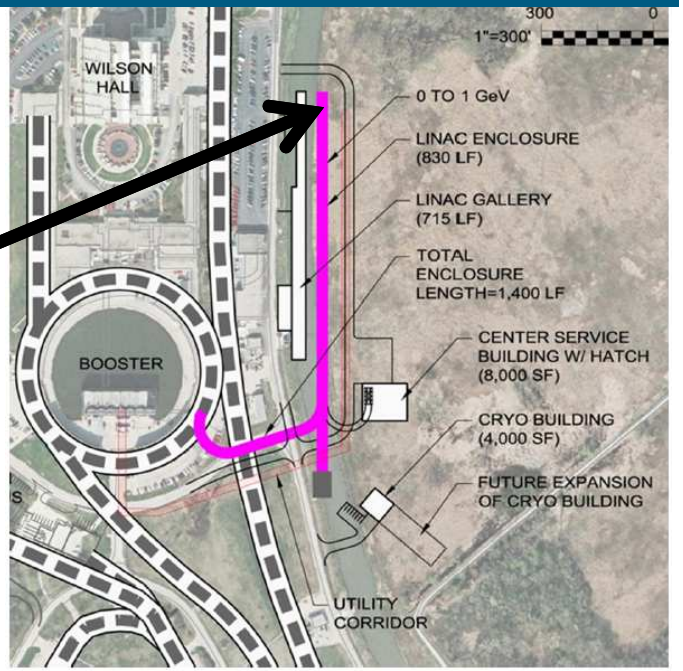



PRESENT : Priority Activities

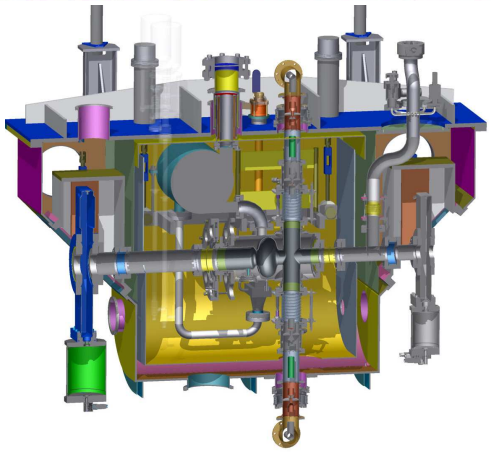
PRESENT : ANL-PHY support of Proton Improvement Plan – II (PIP-II)





- ANL designed/built 1st cryomodule in PIP-II superconducting linac
- >1 MW of proton beam power in support of the U.S. neutrino program
- Cryomodule delivery to Fermilab in 2019

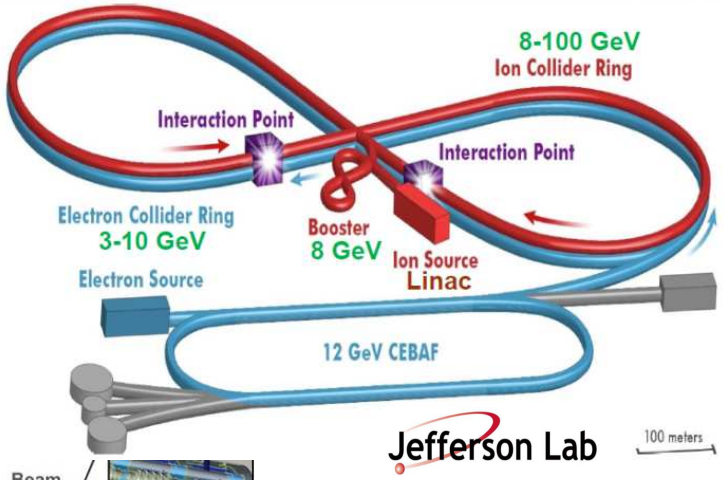
PRESENT : Bunch Lengthening Superconducting Cavity APS-Upgrade

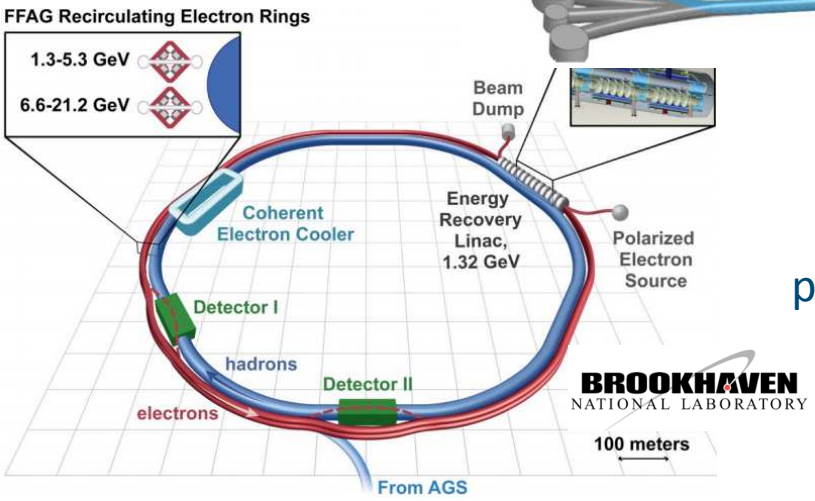


- Practical benefit to all APS-U users by increasing beam lifetime;
- High priority at ANL and DOE
- Completion in 2023

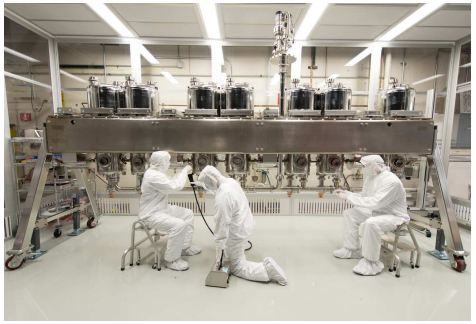
FUTURE : Advancing Technology for ATLAS and other DOE Accelerators

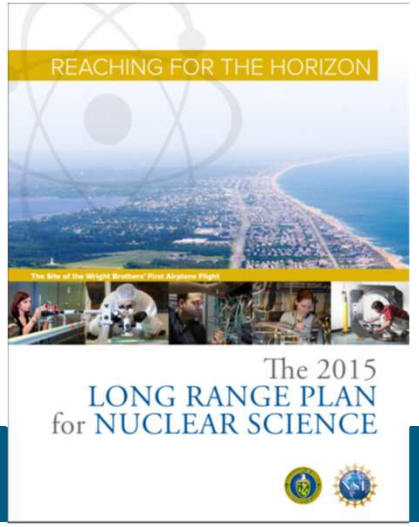
Technologies in support of the ATLAS Multi-User Upgrade (FY20-22)

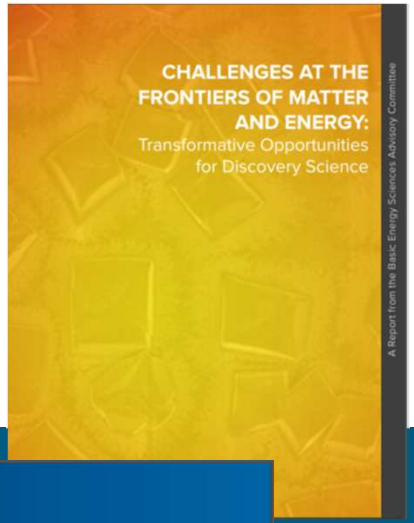




Technology contributions to the proposed Electron-Ion Collider (FY22-)







FUTURE

We are eager to work with industry/private sector partners on superconducting RF and related accelerator technologies:

- Basic science
- Medicine/Isotopes
- Industry
- Energy production
- National security